ATTACHMENT 5
CLOSURE and POST-CLOSURE PLAN

CLOSURE PLANS, POST-CLOSURE PLANS AND FINANCIAL REQUIREMENTS

Closure Plans

Attached is the Goff Mountain Landfill (GML) Closure Plan for the Institute Plant's hazardous waste management unit . (Attachment I-1-1 of the Part B Application)

. Closure Performance Standard

The closure performance standards are set forth in the closure plan referred to above.

Partial Closure and Final Closure Activities

These requirements are all described, to the extent applicable, in the closure plan for the hazardous waste management unit.

Maximum Waste Inventory

See the closure plan for the hazardous waste management unit.

Schedule for Closure

See the closure plan for the hazardous waste management unit.

Time Allowed for Closure

See the GML closure plan.

Extension for Closure Time

This is not applicable, the Institute Plant does not contemplate an extension will be necessary. If necessary, a formal permit modification for an extension will be submitted at the time of facility closure.

Closure Procedures

Inventory Removal

See the GML Closure Plan.

Disposal or Decontamination of Equipment, Structures and Soils

See the descriptions in the Closure Plan for the hazardous waste management unit.

Closure of Disposal Units/Contingent Closures

The Institute plant has no disposal units requiring contingent closure plans.

Disposal Impoundments

There are no surface impoundments in operation at the facility. The former surface impoundments underwent closure and will undergo post-closure care in accordance with post-closure plans that have been previously approved by the WVDEP and meet the requirements of 40 CFR 264.228. The post closure plans for the surface impoundments are attached as (Attachment I-1-2 of the Part B Application)

Elimination of Liquids

Not applicable.

Waste Stabilization

Not applicable.

Cover Design

This information is included in the closure plan for the Goff Mountain Landfill, attached as Attachment I-1-1 and for the surface impoundments (Attachment I-1-2.

Minimization of Liquid Migration

See the closure plans for the Goff Mountain Landfill.

Maintenance Needs

See the closure and post-closure plans for Goff Mountain Landfill and the former surface impoundments.

Drainage and Erosion

See the closure and post-closure plans for Goff Mountain Landfill and the surface impoundments.

Settlement and Subsidence

See the closure and post-closure plans for Goff Mountain Landfill and the surface impoundments.

Cover Permeability

See the closure plans for Goff Mountain Landfill and the surface impoundments.

Freeze/Thaw Effects

See the closure plans for Goff Mountain Landfill and the surface impoundments.

Closure of Containers

Container storage area RCRA closed in 2012, therefore sectionI-1e(4) of the Part B Application is not applicable.

Closure of Tanks

Tanks 4623, 1043, 1044 and 1021 were RCRA Closed in 2012, therefore section I-1e(5) of the Part B Application is not applicable. All tanks had secondary containment and are thus exempt from contingent closure plans.

Closure of Waste Piles

Not applicable. The Institute facility has no waste piles.

Closure of Surface Impoundments

Not applicable. All surface impoundments at the Institute facility are closed.

Closure of Incinerators

The Institute facility has no incinerators.

Closure of Landfills

See the closure plan for the Goff Mountain Landfill in this Attachment. Lifts 1-5 and 6-9 C have been closed and are in post-closure status.

Closure of Land Treatment Facilities

Not applicable. The Institute facility has no land treatment facilities.

Continuance of Treatment

Institute has no land treatment facilities.

Closure of Miscellaneous Units

Not applicable. Miscellaneous Unit closed in 2008.

Closure of Boilers and Industrial Furnaces (BIFs)

Not Applicable. The BIF boilers were closed in 2012 and are not part of this Permit Application. The WVDEPDAQ had oversight responsibility for the BIF Boilers.

Closure of Container Buildings

The Institute facility has no containment buildings.

Post-Closure Plan/Contingent Post-Closure

See Post-Closure Plan in this Attachment for the following facilities:

(1) Wastewater Treatment Unit Former Surface Impoundments:
Biobasins 1, 2 and 3
Equalization Basin
Emergency Basin
No. 2 Sludge Holding Pond.

(2) Goff Mountain Landfill:
Former Leachate Basin
Former Lifts 1 through 5
Former Lifts 6 through 9
Expansion Area

Notices Required for Disposal Facilities

Certification of Closure

See the closure plans for Goff Mountain Landfill and the surface impoundments.

Survey Plat

See the closure plan for Goff Mountain Landfill and the surface impoundments.

Post-Closure Certification

See the post-closure plans for Goff Mountain Landfill and the surface impoundments.

Post-Closure Notices

See the post-closure plans (Attachment I-2-1) for Goff Mountain Landfill and the surface impoundments.

Closure Cost Estimate

See the closure plans for each hazardous waste management unit.

Closure Letter of Credit

Attachment I-5c-1 of the Part B Application has a copy of irrevocable letter of credit with the wording required by 40 CFR 264.151(d) and a copy of the Standby Trust Agreement. The Letter of Credit has been issued for a period of one year and is in the amount of the estimated closure and post-closure costs for all of Institute's hazardous waste management units.

Post-Closure Cost Estimate

See the post-closure plans for the Goff Mountain Landfill and the surface impoundments.

Financial Assurance Mechanism for Post-Closure Care

The Institute facility has chosen to issue a Letter of Credit pursuant to 264.145(d).

Liability Requirements

Institute has chosen to provide a Certificate of Liability Insurance as provided below.

Coverage for Sudden Accidental Occurrences

Endorsement of Certification

Attached is a Certificate of Liability Insurance with the wording as specified in 264.141(j) providing for insurance covering sudden and non-sudden accidental occurrences in the amounts required by 264.147 (Attachment I-5c-1 of the Part B Application).

State Assumption of Responsibility

Not applicable.

CLOSURE PLAN

GOFF MOUNTAIN LANDFILL

Bayer CropScience
Institute, West Virginia

E.P.A. I.D. No. WVD 005005509

January, 2013

Goff Mountain Landfill (GML)
Closure Plan

Closure of the GML will consist of the following activities:

- Preparation of completed lifts
- Placement of low-permeability soil cover
- Placement of drainage layer
- Placement of topsoil and vegetative cover

Activities relating to the GML Closure Plan are discussed in the following text.

CLOSURE PERFORMANCE STANDARD

The GML will be closed in a manner which minimizes future maintenance needs and controls adverse impacts to ground water. The final cover will meet the requirements of 40 CFR 264.310(a), including:

- Providing long-term minimization of migration of liquids through the closed landfill
- Function with minimum maintenance
- Promoting drainage and minimizing erosion or abrasion of the cover
- Accommodating settling and subsidence so that the integrity of the cover is maintained
- Having a cap permeability less than or equal to the permeability of any bottom liner system or natural subsoils present.

FINAL COVER DESIGN

The primary objective of the final cover is to minimize surface water infiltration into the landfill mass and to prevent storm water run-on or run-off from coming in contact with the waste material placed in the landfill. The final cover will span the entire area encompassing Lift 9 East, Lifts 6 through 9 West and the expansion area. The cover configuration on the bench area of Lift 9 East and Lift 6 West will vary slightly from the sloped surfaces. The final cover on the bench area of Lift 9 East and Lift 6 West is as follows:

- Low-permeability soil
- Synthetic liner
- Sand drainage layer
- Vegetated topsoil cover.

The cover on the sloped surface of Lift 9 East, Lifts 6-9 West, and the expansion area is as follows:

- Low-permeability soil
- Synthetic drainage layer
- Vegetated topsoil layer

Clean borrow soil will be used to bring each lift to the precap-design grade and establish a clean/dirty break.

Since the GML is built on a slope, a major design consideration for the cover is the assurance of long-term slope stability. For this reason, it is advantageous to design a final cover that is as reasonably light in weight yet still capable of insuring that infiltration is minimized. The final cover after the clean/dirty break shall consist of the following layers, from the underside to the top:

- Twenty-four inches of low-permeability compacted clay soil having a maximum hydraulic conductivity of 10^{-7} centimeters per second (cm/sec) will cover the entire area. The bench on Lift 9 East and Lift 6 West cover will be graded to provide drainage towards the rear of each bench. The bench will also be sloped towards the peripheral channel on the eastern side of the landfill to promote runoff and minimize infiltration.

- A six-inch layer of sand (only on the bench of Lift 9 East and Lift 6 West) will provide drainage of water which has infiltrated the top vegetative layer. The minimum hydraulic conductivity of the sand will be 10^{-3}cm/sec. Perforated polyethylene drain pipes will be placed at the mid-width of the bench and along the rear of each bench to intercept flow traveling through the sand and direct it to the eastern peripheral channel. The sand will be protected from blinding by a non-woven synthetic filter fabric that will be placed above it.

- A synthetic drainage layer will be placed on the sloped surfaces of Lift 9 East, Lifts 6-9 West and the expansion area.

- An 18-inch layer of topsoil will cover the entire area to provide protection for the underlying layers. The topsoil will be vegetated with a good grass cover to minimize infiltration and erosion.

MAXIMUM WASTE INVENTORY

An additional volume of 291,197 yd^3 will have been placed in Lifts 6 through 9 West and the expansion area at final closure.

CLOSURE WORK PLAN

Preparation of Completed Lifts

The final layers of wastes placed in each lift of the landfill will be graded and compacted to the greatest practicable density to provide a suitable foundation for the cover. Low elevation areas in a lift will be brought to precap design grade by the placement and compaction of waste and/or clean fill. The lift will then be graded and proof rolled, if necessary, to provide a firm base to support the cap.

Placement of Low-Permeability Soil Cover

The low-permeability cover will be thoroughly tested prior to acceptance.

The geotechnical testing protocol to be performed include the following:

- Natural moisture content (American Society for Testing and Materials [ASTM] D 2216) to determine borrow moisture conditions
- Atterberg limits (ASTM D 423-66 and D 424-59) to confirm a plastic, workable material
- Grain-size distribution (ASTM D 422-66) to confirm an acceptable percentage of fine-grained materials
- Standard Proctor density (ASTM D 698-78) to establish optimum water content and maximum dry density conditions. These tests will also be used in the determination of percent compaction requirements and for subsequent permeability testing of additionally compacted samples at optimum conditions
- Constant-head permeability of undisturbed samples to assure that the material meets the permeability specification.

The clay material will be placed in thin lifts to achieve the specified in-place permeability of 10^{-7} cm/sec or less. As the clay cap is placed, routine quality control testing similar to that used in the selection of the clay will be used to verify that placed material meets specifications.

Placement of Drainage Layer on Bench of Lift 9 East and Lift 6 West

The sand used in the drainage layer of the bench areas will be thoroughly tested before acceptance. In order to perform properly, it must be clean and free of any clay or silty materials and have a minimum permeability of 1×10^{-3} cm/sec.

The sand layer will drain any water which may percolate through the bench topsoil layer to the rear of the bench. A perforated polyethylene drain tube wrapped with filter fabric will be installed along the mid-point and rear of the bench area to intercept the flows and convey them toward the east peripheral channel. The sand layer will be protected from blinding by the placement of a geotextile filter fabric on top of the finished sand layer prior to placement of the topsoil layer.

The nonwoven geotextile filter fabric will consist of a pervious sheet of polymeric fibers oriented in a stable network. The fabric will be mildew and rot-resistant and shall be free of any treatment or coating which might detrimentally alter its physical properties. The fabric will be loosely laid flat over the prepared sand surface, overlapping a minimum of 12 inches with adjacent panels. Care will be taken during installation to prevent damage to the filter fabric or the sand layer.

Placement of Drainage Layer on Sloped Surfaces of Lift 9 East, Lifts 6-9 West and the Modified Area

The synthetic drainage layer shall cover all areas that will not be covered with the sand drainage layer. The synthetic drainage materials shall be overlapped in accordance with the manufacturer's specifications. On Lift 9 East and Lift 6 West only, the drainage material shall be anchored in a one-foot trench excavated into the low-permeability soil. The drainage material shall be anchored by backfilling. The anchor trench will be backfilled with well-compacted, low-permeability soil. Infiltration through the liner along the synthetic drainage medium will be prevented by laying the synthetic bench liner over the bench slope.

Placement of Topsoil and Vegetative Cover

A topsoil layer of 18-inch final thickness shall be placed over the filter fabric on the bench and sloped surface. The soil will be tested to determine whether it has the proper nutrient balance before seeding. The entire capped area will be seeded, fertilized, and mulched to establish vegetation and control erosion. Typical application rates for the materials to be applied are estimated as follows:

- Liming: Agricultural grade dolomitic limestone applied at a rate of two tons per acre (tons/acre) or as necessary to adjust the pH to 6.0 or greater

- Fertilization:
  - 50 pounds per acre (lbs./acre) water-soluble nitrogen
  - 50 lbs./acre slow releasing nitrogen
  - 75 lbs./acre phosphate fertilizer
  - 50 lbs./acre potassium oxide

- Seeding: 80 lbs/acre of a mixture of grass
  - Tall fescue - 65 percent
  - Reed canary grass - 20 percent
  - Annual ryegrass - 15 percent

- Mulching: Hay or straw applied at a rate of two tons/acre. The hay should be free of seeds and roots of woody plants or noxious weeds.

FINAL INSPECTION AND CERTIFICATION

An independent registered professional engineer and the Institute Plant will both certify that closure activities were completed in accordance with the requirements of the approved plan. Certification will include a survey plat of the landfill lifts which will be prepared by a registered professional land surveyor and a note, prominently displayed, that the lifts will not be disturbed as provided in 40 CFR Subpart G regulations. A drawing of the survey plat will be submitted to the local zoning authority and to the WVDEP.

NOTICE IN DEED

After closure of the landfill is completed, a notice will be placed in the property deed as required by 40 CFR 264.119. Local land authorities will also be notified in accordance with the regulations.

SCHEDULE FOR CLOSURE

Completion of closure will be within 180 days of agency approval of the closure plan or the last receipt of waste, whichever occurs later. The schedule for closure including milestone dates is as follows:

Day	Activity
-180	Preparation and submittal of detailed closure plan for agency approval
0	WVDEP approval of closure plan or last receipt of waste
180	Completion of closure and certification submitted to the WVDEP

An extension of the 180-day period limitation during any stage of closure is not anticipated; however, if unforeseen circumstances, such as an extended period of adverse weather, indicate a need for an extension, The Institute Plant will request it as provided in 40 CFR 264.113.

CLOSURE COST ESTIMATE

The following table is an estimated closure cost for the existing landfill and the landfill expansion.

Goff Mountain Landfill
Closure Cost Estimate

Activity	Cost (2013$)
Mobilization/Site Prep./Demobilization	30657
Preparation of Surface for 6" Clay Layer	89695
Placement of 24" Clay Layer	996,509
Placement of 6" Sand Drainage Layer on Bench	254,212
Placement of Synthetic Drainage Layer on Slopes	506,602
Placement of HPDE Drainage Pipe in Sand Drainage Layer	39,308
Placement of Filter Fabric Over Sand Drainage Layer	187,884
Placement of Topsoil Cover Material	571,852
Seeding and Mulching Topsoil Cover	62,680
Health and Safety Provisions	28,834
Subtotal:	*$2,781,756*
Contingency @ 10%	
Total:	**$3,059,932**

FINANCIAL ASSURANCE MECHANISM FOR CLOSURE AND POST-CLOSURE

See Section I-7 of the Part B Application for appropriate copies of financial assurance.

LIABILITY INSURANCE REQUIREMENTS

See Section I-8 of the Part B Application for appropriate copies of liability insurance.

POST-CLOSURE PLAN

FOR

(1) WASTEWATER TREATMENT UNIT FORMER SURFACE IMPOUNDMENTS;

- BIOBASINS 1, 2 AND 3,
- EQUALIZATION BASIN,
- EMERGENCY BASIN, AND
- NO. 2 SLUDGE HOLDING POND.

(2) GOFF MOUNTAIN LANDFILL;

- FORMER LEACHATE BASIN,
- FORMER LIFTS 1 THROUGH 5,
- FORMER LIFTS 6 THROUGH 9C,

Bayer CropScience
Institute, West Virginia

EPA I.D. No. WVD 005005509

January, 2013

Title Page

POST-CLOSURE PLAN/CONTINGENT POST-CLOSURE PLAN

The following represents the Post-Closure requirements for the following facilities:

(1) Wastewater Treatment Unit Former Surface Impoundments:
- Bio-basins 1, 2 and 3
- Equalization Basin
- Emergency Basin
- No. 2 Sludge Holding Pond

(2) Goff Mountain Landfill:
- Former Leachate Basin
- Former Lifts 1 through 5
- Lifts 6 through 9C

INSPECTION PLAN

An inspection is conducted semi-annually. Check lists are used as inspection logs to document the condition of the closed facility and to ensure any necessary repairs are made. Items covered during this inspection include the following and are based on the type and design of closure:

- Integrity of run-on and run-off control measures;
- Evidence of erosion;
- Evidence of settling, subsidence, or displacement;
- Evidence of vandalism;
- Signs of rodent damage;
- Condition of vegetation;
- Cover drainage system functional;
- Condition of secondary containment (Emergency and Equalization Basins only);
- Leak detection system (GML)
- Condition of well caps;
- Integrity of well locks;
- Condition of well ground seals.

MONITORING PLAN

Groundwater monitoring activities around the closed surface impoundments at the Goff Mountain Landfill are described in Section E of the RCRA Permit application.

MAINTENANCE PROGRAM

The maintenance program during the post-closure period will consist of the following items. All maintenance will be performed as necessary.

- Replacing locks;
- Repairing ground seals;
- Mending fences;
- Filling erosion and subsidence areas;
- Reseeding, fertilizing, and liming as necessary to maintain a continuous vegetative cover;
- Removing vegetation with roots that may damage the cover;
- Repairing the run-on and run-off control measures;
- Repairing secondary containment (Emergency and Equalization Basins only);
- Leak Detection System

POST-CLOSURE SECURITY

After closure, hazardous waste will not be exposed and the closed areas will not be used for further development. In addition, the areas will not be accessible to the general public or used for domestic livestock. The areas are surrounded by chain-link fencing topped with barbed wire. A gate controlling access is maintained by a card reader system which limits access into the areas. Signs which read "DANGER - UNAUTHORIZED PERSONNEL KEEP OUT" are posted along the fence. The lettering is clear and is easily legible at 25 feet.

POST-CLOSURE CONTACT

During the post-closure care period, the Wastewater Treatment Unit will remain in operation. The post-closure care provisions remain the responsibility of the Institute Plant. Should someone desire to contact the facility, an appropriate person can be reached by dialing (304) 767-6000 or by mailing to P. O. Box 1005, Institute, WV, 25112.

POST-CLOSURE CERTIFICATION

Within 60 days of completing the post-closure requirements, the WVDEP will be provided a statement certifying that post-closure care was performed in accordance with the Post-Closure Plan.

POST-CLOSURE NOTICES

After the closure is complete, a notice will be placed in the property deed as required by 40CFR 264.119. Local land authorities will also be notified in accordance with the appropriate regulations.

POST-CLOSURE COST ESTIMATE

Below are the estimated post-closure costs.

Goff Mountain Landfill
Post-Closure Cost Estimate

Activity	Annual Cost (2013 $)	Life Cycle Cost (2013 $)[1]
Ground Water Monitoring	60,000	1,799,999
Inspection	3706	111,185
Mowing	22,614	678,403
Reseeding/Mulching/Fertilizing	4,996	149,886
Erosion	4,512	135,362
Fence Maintenance	1214	36,424
Drainage Maintenance	2,806	84,186
Leachate Collection and Removal	7,588	227652
Total:	**$107,437**	**$3,223,098**

(1) Based on 30 years after closure.

Former Biobasins No. 1, 2, and 3
Post-Closure Cost Estimate[1]

Activity	Annual Cost (2013 $)	Life Cycle Cost (2013$)[2]
Ground Water Monitoring	188,590	5,657,700
Inspection	3,706	111,185
Mowing	22,613	678,403
Reseeding/Mulching/Fertilizing/Erosion	4,996	149,886
Road Maintenance	1,973	59,190
Fence Maintenance	1,821	54,637
Drainage Maintenance	2,806	84,186
Monitoring Well Maintenance/Repair	2,428	72,849
Total:	**228,935**	**6,868,035**

(1) Since the WWTU will remain operational, post-closure costs associated with the other surface impoundments will be a part of the WWTU's routine operating costs.
(2) Based on 30 years after closure.